



(11) **EP 3 902 045 A3**

(12) **EUROPEAN PATENT APPLICATION**

(88) Date of publication A3:
24.11.2021 Bulletin 2021/47

(51) Int Cl.:
H01M 10/00 (2006.01)

(43) Date of publication A2:
27.10.2021 Bulletin 2021/43

(21) Application number: **21169235.5**

(22) Date of filing: **19.04.2021**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
KH MA MD TN

(71) Applicant: **Sumitomo Rubber Industries, Ltd.**
Kobe-shi, Hyogo-ken 651-0072 (JP)

(72) Inventors:
• **FUMIYA, Chujo**
Kobe-shi, 651-0072 (JP)
• **KUBO, Tatsuya**
Kobe-shi, 651-0072 (JP)

(30) Priority: **20.04.2020 JP 2020074882**
16.02.2021 JP 2021022756

(74) Representative: **Manitz Finsterwald**
Patent- und Rechtsanwaltspartnerschaft mbB
Martin-Greif-Strasse 1
80336 München (DE)

(54) **ORGANIC SULFUR MATERIAL, ELECTRODE, AND LITHIUM-ION SECONDARY BATTERIES, AND PRODUCING METHOD**

(57) It is an object of the present invention to provide a novel organic sulfur material which is capable of improving a charge/discharge capacity and cycle characteristics, an electrode comprising the organic sulfur material, that is, a positive electrode or a negative electrode, and a lithium-ion secondary battery comprising the elec-

trode. Provided is an organic sulfur material comprising a sulfur-modified acrylic resin, wherein an acrylic resin has peaks around 756 cm⁻¹, around 1066 cm⁻¹, around 1150 cm⁻¹, around 1245 cm⁻¹, around 1270 cm⁻¹, around 1453 cm⁻¹, and around 1732 cm⁻¹ in an FT-IR spectrum.

EP 3 902 045 A3



EUROPEAN SEARCH REPORT

 Application Number
 EP 21 16 9235

5

10

15

20

25

30

35

40

45

50

55

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	EP 2 337 126 A1 (NAT INST OF ADVANCED IND SCIEN [JP]; TOYOTA JIDOSHOKKI KK [JP]) 22 June 2011 (2011-06-22) * abstract * * claims 1-18 * * paragraph [0090] *	1-20	INV. H01M10/00
X	WO 2019/167875 A1 (ADEKA CORP [JP]) 6 September 2019 (2019-09-06) * abstract * * claims 1-8 * * paragraphs [0009] - [0014] * * paragraphs [0112] - [0119] *	1-20	
			TECHNICAL FIELDS SEARCHED (IPC)
			H01M
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 16 October 2021	Examiner Stachowiak, Olaf
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

 1
 EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 21 16 9235

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

16-10-2021

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 2337126 A1	22-06-2011	CN 102160217 A	17-08-2011
		EP 2337126 A1	22-06-2011
		JP 5534227 B2	25-06-2014
		JP WO2010044437 A1	15-03-2012
		KR 20110070868 A	24-06-2011
		US 2011200875 A1	18-08-2011
		WO 2010044437 A1	22-04-2010

WO 2019167875 A1	06-09-2019	CN 111656587 A	11-09-2020
		EP 3761416 A1	06-01-2021
		JP WO2019167875 A1	25-02-2021
		KR 20200127155 A	10-11-2020
		TW 201937792 A	16-09-2019
		US 2020350587 A1	05-11-2020
		WO 2019167875 A1	06-09-2019
